

**Gill net Mesh Size in the California Herring Fisheries
Historical Background Notes – Summary Table**

Season	Regulation/Change/Why? (if no reference as to why indicated, none was found)
1976-77	The length of meshes of any gill net shall not be less than 2 inches or greater than 2 ½ inches (all bays). The upper limit of 2 ½ inches was specified for districts 11, 12, and 13 in the Fish and Game Code. Industry concern.
1977-80	No information on mesh change in files.
1980-81	Provision for fresh fish mesh size of no more than 1 ¾ inches and distinction between roe fishery and fresh fish fishery.
1981-82	No information on mesh change in files.
1982-83	In Tomales and Bodega Bay the length of the meshes of any gill net used in the roe fishery shall not be less than 2 inches or greater than 2 ½ inches. In all other permit areas the length of the meshes of any gill net used in the roe fishery shall not be less than 2 1/4 inches or greater than 2 ½ inches from November 28 through January 14. On or after such date the Director may, if the established fishing quotas are not filled and such action will not impact the herring resource, authorize the use of 2 1/8 inch or 2 inch minimum mesh for gill nets used in the roe fishery. Industry request.
1983-84	Date change to allow minimum 2 1/8 inch mesh, essentially, for the odd and even platoons in San Francisco Bay. A maximum mesh size was established for the fresh fish fishery. Language was also added on mesh measurement.
1984-85	Regulatory change to allow minimum 2 1/8 inch mesh for the XH fishery in San Francisco Bay, making the mesh size uniform in all areas (Crescent City, Humboldt and San Francisco) other than Tomales and Bodega bays. Decision made as a result of industry questionnaire.
1985-86	Increase in maximum mesh size in the fresh fish fishery to 2 inches. Industry request.
1986-87	Removal of subsection describing method of measurement for gill net mesh. Enforcement proposal.
1987-88	Minimum mesh for Humboldt Bay and Crescent City changed increased to 2 ¼ inches. Industry request.
1988-92	There are no changes to mesh size or mesh measurement methods in regulation. In 1991-92 the 'Banzai' area closure in San Francisco Bay was added to the regulations.
1992-93	The minimum mesh size in Tomales Bay was increased to 2 1/8 inches to reduce the potential take of younger, smaller fish and outer Bodega Bay was closed to fishing. There were no other changes to regulations in other bays. Tomales Bay had been closed to fishing since the 1989-90 season while fishing continued in Bodega Bay during this period.
1993-96	There are no changes to mesh size or mesh measurement methods in regulation.
1996-97	Mesh measurement method implemented with 3 percent tolerance for all herring fisheries in California. Language was added to provide for three permittees to participate in a Department sponsored mesh size study in San Francisco Bay.
1997-98	No tolerance included in mesh measurement; last season of round haul fishery.
1998-99	No changes to mesh size or mesh measurement in regulation.
1999-2000	Language was proposed to allow four permittees to participate in a Department sponsored mesh size study in Tomales Bay.
2000-01	Tomales Bay mesh size study using a minimum mesh of 2 inches. Study was provided to allow the Department to evaluate the use of this mesh length on the current population (shorter length at age) and assess whether increased CPUE could be obtained for the catch and still maintain the Department's management goal of a conservative 10 percent exploitation rate.
2001-02	Continuation of the fleet-wide Tomales Bay mesh size study. Clarification of the size of peg and weight used in the measurement of mesh was added to subsection (f)(2)(B).
2002-03	Continuation of the fleet-wide Tomales Bay mesh size study. Revised the quota designated for the mesh size study and increased the number of study participants from three to six in San Francisco Bay.
2003-04	Continuation of the fleet-wide Tomales Bay mesh size study. Peer review of San Francisco Bay stock and methodology (prior to season).

Gill net Mesh Size in the California Herring Fisheries Historical Background Notes – Detailed Notes

This information is a summary of mesh size and mesh measurement changes to regulations for herring gill net fisheries in California from the 1976-77 season to 2003-04. The information covers all fisheries, Crescent City, Humboldt Bay, Tomales Bay and San Francisco Bay. In summary, none of the mesh size changes are based on experimental data or study conducted prior to regulatory change. All of the changes to the mesh size are on the minimum mesh allowed; the maximum has remained unchanged since a mesh size range was specified for the 1976-77 season. The maximum mesh size was stated, originally, in Fish and Game Code, and was most likely the source of establishing the limit; there is no reference in the files as to the rationale for a maximum mesh size. Many of the mesh size changes were at the request of the industry. The changes to the method of mesh measurement have been at the request of industry, Department enforcement and Department biologists.

The references for this information are the Director's Herring Advisory Committee (DHAC) meeting minutes and the Section 163, Title 14 CCR regulatory documents (Pre-publication of Notice/Initial Statement of Reasons, Pre-Adoption Notice and Final Document and regulations) unless otherwise noted. Information in quotation marks is a direct quote; all other information is paraphrased from the document referenced for that year. Personal names have been removed and replaced with "Industry", "Department staff", or "Department enforcement personnel" where appropriate. Information on regulations under each of the bulleted sections comes from Section 163 of Title 14 unless otherwise noted. Information under the section "Notes from the DHAC meeting minutes" is taken directly from the DHAC meeting minutes on file for that year. Information on regulatory changes is from DHAC meeting minutes and regulatory documents. See table at the end of this section for documents used for each year.

- 1975-76 Season. Draft regulations for this season are on file. There is no reference to minimum or maximum mesh size.
- 1976-77 Season. Mesh size regulations: The length of meshes of any gill net shall not be less than 2 inches or greater than 2 ½ inches. (Section 163, Title 14, CCR) The upper limit of 2 ½ inches for districts 11, 12 and 13 was stated in §8688 of the Fish and Game Code. "These changes will alleviate the concerns expressed by the commercial fishermen regarding the use of gill nets to take herring while still affording adequate protections to the herring resource as well as important sport species (October 6, 1976 letter from the Director to the Commission). The October 6, 1976 letter specifies a minimum of 1 ½ inches; a 2 inch minimum was specified in the regulations apparently as a result of earlier industry input and correspondence dated December 15, 1976.
- 1980-81 Season. Mesh size regulations: Provision for fresh fish mesh size of no more than 1 ¾ inches and distinction between roe fishery and fresh fish fishery. (Section 163, Title 14, CCR)

Notes from the March 17, 1981 DHAC meeting minutes:

(Net measurement and mesh size) A survey questionnaire was distributed to gill net permittees prompted by the differences in production which resulted from the use of various mesh sizes. A DHAC member stated that many gill netters switched to smaller (2 inch) mesh nets this year because of the abundance of smaller fish and there was concern that extensive use of 2 inch mesh would impact the resource. Department staff presented the following results from the fish samples collected during the season:

Mesh size (inches)	Average Roe Recovery (Percent)	Percent Females	Ave. Length (cm)	Age Composition
2 ¼	18.1	75	20	93% of samples age 4-6
2 1/8	17.3	70	19.5	93% of samples age 3-5
2	14	58	?	84% of samples age 3-4

A lengthy discussion followed on the issue of minimum mesh size. It was decided to recommend 2 ¼ inch minimum mesh size for San Francisco Bay, Humboldt Bay and Crescent City and a 2 1/8 inch minimum mesh size for Tomales Bay, with a provision that would allow the Director to reduce the minimum mesh size to 2 inches after February 1 if warranted.

- 1981-82 Season. Mesh size regulation unchanged. However in the August 12, 1981 Pre-Adoption Statement under "Summary of primary considerations raised in opposition to the proposed action and reason(s) for rejecting those considerations" in response to item 3, "Restrict the length of meshes of gill nets to 2 ¼ - 2 ½ inches", the response reads, "Current regulations provide that the meshes of gill nets shall not be less than 2 inches or greater than 2 ½ inches. This request is based on a desire, by some fishermen and processors, to restrict the catch to larger herring which are economically more valuable in the marketplace. However, there is no biological justification for implementing more restrictive mesh size regulations and such considerations are beyond the scope and authority of the Department."

File Notes: There are two interesting letters from industry that consider the option of increasing the minimum mesh size from 2 to 2 ¼ inches. There is a lot more information in both of these letters; here are excerpts from both:

"As you know, although 2 to 2 ½ inch has been the legal range of mesh size, the 2 ¼ inch mesh has been used by approximately 90 percent of the fishermen. This mesh size produces primarily five year olds and up herring and the best roe recovery available." "The problems with the 2 inch mesh are several: 1. It harvests stocks down into the three-year age class. This defeats the idea of harvest by gill net to take mature, older age herring while allowing younger stocks to spawn and return to sea." DHAC member, letter to the Director dated July 19, 1981.

"As a resource held as a public trust, the department should look beyond merely protecting the resource and assure that the maximum value is gained from this resource." "Without the department making clear its intent soon on mesh sizes, there will be a mad dash for nets with fishermen being uncertain of what mesh size to purchase. The industry, by itself, cannot regulate mesh sizes, since there is one overall quota and each fisherman must work to catch as much as possible." Industry Representative, letter to the Director dated July 10, 1981.

- 1982-83 Season. Mesh size regulations: In Tomales and Bodega Bay the length of the meshes of any gill net used in the roe fishery shall not be less than 2 inches or greater than 2 ½ inches. In all other permit areas the length of the meshes of any gill net used in the roe fishery shall not be less than 2 1/4 inches or greater than 2 ½ inches from November 28 through January 14. On or after such date the Director may, if the established fishing quotas are not filled and such action will not impact the herring resource, authorize the use of 2 1/8 inch or 2 inch minimum mesh for gill nets used in the roe fishery. (Section 163, Title 14, CCR)

Notes from the March 29, 1983 DHAC meeting minutes:

(Net measurement and mesh size) "A general discussion followed regarding minimum mesh sizes and current measuring techniques used by the Department's enforcement personnel in determining mesh size. It was noted that present methods were not adequate for the highly elastic small mesh monofilament webbing used for herring gill nets. As a result, some fishermen were actually using nets which were constructed of webbing less than minimum size, although legal when measure by the standard means. The director stated that the Department

would develop an alternative measuring method for herring nets which would ensure compliance with the minimum mesh requirements established by the Commission.” (New paragraph) “ It was also suggested, and agreed upon, that the minimum mesh size for gill nets used in the XH fishery would remain at 2 ¼ inches, with a minimum of 2 1/8 inch mesh provided for beginning with the opening of the regular season on January 2, 1984.” (DHAC Meeting Minutes, March 29, 1983)

Complaints were registered, by enforcement and industry, of the use of undersize webbing and the possible development of a standard measurement device using knot to knot measurement. (April 14, 1983 Herring (Public) Meeting Minutes/Notes)

- 1983-84 Season. Mesh size and measurement regulations: In Tomales and Bodega Bay the length of the meshes of any gill net used in the roe fishery shall not be less than 2 inches or greater than 2 ½ inches. In all other permit areas the length of the meshes of any gill net used in the roe fishery shall not be less than 2 1/4 inches or greater than 2 ½ inches from November 27 through December 16. From January 2 through March 30 the length of the meshes of any gill net used in the roe fishery shall not be less than 2 1/8 or greater than 2 ½ inches. The meshes of any gill net used by the fresh fish permittees shall not be greater than 1 ¾ inches.

Subsection (f)(2)(G) was added to read:

(G) Mesh size of gill nets authorized to take herring will be determined by the following method: (1) Suspend a minimum of eleven meshes between a fixed point and a maximum of one pound weight. (2) At least 50% of the meshes, when measured between the knots of or inside the points at which the meshes are joined of each mesh, using a standard stainless steel wedge of appropriate gauge without force, shall not be less than the mesh size of nets authorized pursuant to subsection (f)(2)(B) of these regulations. (3) Beach nets may only be used in Tomales Bay. No permittee may fish more than 75 fathoms of beach net. (Section 163, Title 14, CCR)

Notes from the March 26, 1984 DHAC meeting minutes:

(Net measurement and mesh size) Industry brought up the issue of undersized nets used in the fishery and the measuring method and there was a general discussion as to whether it was appropriate, or necessary, to amend or change the existing regulations.

Industry also discussed the questionnaire sent out to all San Francisco Bay gill net permittees, and the responses (43) received to date:

Minimum mesh size	2 ¼ inch	2 1/8 inch	2 inch
December (XH)	56%	37%	7%
January - March	21%	62%	17%
Individual Quota (bag limit)	Yes = 67%	No = 33%	

One DHAC member recommended a minimum mesh size of 2 1/8 inches for the entire season, including the XH fishery. A general discussion followed on mesh size, manufacturer's specifications, lead time when changing mesh size regulation, etc. The general consensus of the group was to retain the current regulations.

Subsequent results of this questionnaire (183 responses/386 questionnaires sent = 47%. This is broken down into December and Odd/Even Platoon responses:

XH returned 54 responses

Minimum mesh size	2 ¼ inch	2 1/8 inch	2 inch
December (XH)	28%	54%	19%
January - March	9%	52%	17%

Odd/Even returned 129 responses

Minimum mesh size	2 ¼ inch	2 1/8 inch	2 inch
December (XH)	50%	29%	7%
January - March	11%	63%	20%

As a result of this questionnaire, the Department amended proposals for the 1984-85 season regulations to provide for the use of 2 1/8 inch minimum mesh for San Francisco Bay gill nets used in the December (XH) fishery. "The majority of permittees responding to the latest herring questionnaire clearly supported this proposal which will provide uniform mesh size requirements for all San Francisco Bay gill nets used in the herring-roe fishery." (Letter from the Director to the DHAC members dated July 12, 1984)

In a letter dated July 3, 1984, Department biologists expressed the opinion that the minimum mesh size for the December fishery remain the same and provided rationale and catch curves from variable mesh gill nets and commercial catch in explanation.

- 1984-85 Season. Mesh size regulations: In Tomales and Bodega Bay the length of the meshes of any gill net used in the roe fishery shall not be less than 2 inches or greater than 2 ½ inches. In all other permit areas the length of the meshes of any gill net used or possessed in the roe fishery shall not be less than 2 1/8 inches or greater than 2 ½ inches. The meshes of any gill net used by the fresh fish permittees shall not be greater than 1 ¾ inches (Section 163, Title 14, CCR)

Notes from the March 19, 1985 DHAC meeting minutes:

(Net measurement and mesh size) There were no complaints about mesh size noted in the DHAC meeting minutes. Department staff noted the higher proportion of males and 3 year old fish in the December gill net catches were a reflection of the use of smaller mesh gear.

An increase to the fresh fishery mesh size from 1 ¾ to 2 inches was recommended by industry based on the difficulty of obtaining 1 ¾ inch mesh from local dealers and the use of 2 inch mesh would allow fresh fish permittees the opportunity to take larger fish for marketing purposes. "The Department has determined that the use of 2 inch mesh will not result in any adverse impact to the resource, and has proposed such an amendment in the 1985-85 herring regulations." (Pre-Adoption Notice, July 8, 1985)

- 1985-86 Season. Mesh size regulations: In Tomales and Bodega Bay the length of the meshes of any gill net used in the roe fishery shall not be less than 2 inches or greater than 2 ½ inches. In all other permit areas the length of the meshes of any gill net used or possessed in the roe fishery shall not be less than 2 1/8 inches or greater than 2 ½ inches. The meshes of any gill net used by the fresh fish permittees shall not be greater than 2 inches (Section 163, Title 14, CCR)

Notes from the March 4, 1986 DHAC meeting minutes:

(Net measurement and mesh size) A proposal was made by Department enforcement personnel to remove the language in subsections (f)(2)(G)(1) and (2) of Section 163, Title 14, CCR because the "method of measurement which is impractical and in conflict with Fish and Game Code Section 8602. Fish and Game Code Section 8602 has been upheld in court (Pennisi vs. California) and I see no benefit to the measurement described in Section 163." (Memorandum dated March 4, 1986 from Enforcement personnel to the Department) Subsection (f)(2)(G)(3) remained in the regulations under subsection (f)(3). This language was removed for the 1986-87 season.

A DHAC member proposed to limit gill nets to 2 ¼ inch mesh size only in the Humboldt Bay fishery.

- 1986-87 Season. No changes to mesh size or mesh measurement methods in regulation.

Notes from the March 4, 1987 DHAC meeting minutes:

(Net measurement and mesh size) Department enforcement noted that following the seizure of an undersized net, a number of abandoned nets with undersized mesh were found on the docks the following day.

A DHAC member proposed establishing the minimum legal mesh size at 2 ¼ inches in Humboldt Bay and Crescent City, because essentially all existing permittees are using 2 ¼ inch mesh nets at the present time and they wish to insure that the quality of the fish remains the same in the future should new, or additional, permittees enter the fishery.

- 1987-88 Season. Mesh size regulations: In Tomales and Bodega Bays the length of the meshes of any gill net used or possessed in the roe fishery shall not be less than 2 inches or greater than 2 ½ inches. In Humboldt Bay and Crescent City Harbor the length of the meshes of any gill net used or possessed in the roe fishery shall not be less than 2 ¼ inches or greater than 2 ½ inches. In San Francisco Bay the length of the meshes of any gill net used or possessed in the roe fishery shall not be less than 2 1/8 inches or greater than 2 ½ inches. The meshes of any gill net used or possessed by fresh fish permittees shall not be greater than 2 inches. (Section 163, Title 14, CCR)

Notes from the March 25, 1988 DHAC meeting minutes:

(Net measurement and mesh size) Industry noted that “under the present system, 2 inch mesh can easily pass as 2 1/8 inch mesh because of the elasticity of the monofilament webbing”.

- 1988-89 Season. No changes to mesh size or mesh measurement methods in regulation.

Notes from the March 20, 1989 DHAC meeting minutes:

(Older fish in catch) “The Department biologist noted that gill net catches were dominated by 4, 5 and 6 – year old fish, similar to the previous season (1987-88). However, it had been expected that the landing would be dominated by 5, 6, and 7 – year old fish. In the biologist’s opinion, the fact that they were not is reflective of the need to go to larger mesh gill nets. Also, the landing showed a 50/50 sex ration when it should have been 60/40 (females to males) or higher. This is further evidence of the need for larger mesh gill nets.” The minutes also note an abundance of 3 and 4 – year old fish in the Tomales Bay catch “reflective of the need for larger mesh gill nets”.

(Net measurement and mesh size) “He (Department enforcement) noted that the elasticity of today’s net material made it possible for 2 inch nets to easily meet the standards of a 2 ½ in net gauge.” “(Department enforcement) said that the fishermen’s concern is that next year some individual will use less than 2 inch mesh”. “In his (DHAC member) opinion, the gill net mesh size is critical and 2 1/8 inch mesh is the absolute minimum that should ever be used. He favored a previous regulation of several years ago that require 2 ¼ inch minimum mesh in December through the first two weeks in January. After that date 2 1/8 inch mesh was allowed. He stated that much of the fleet was using 2 1/16 inch mesh and some were even using 2 inch mesh. He believes the Department need to change the “measuring” law and suggests that legislation be introduced to do so.”

(Recommendations for 1989-90) “The first recommendation was to increase the minimum mesh size for gill nets to 2 ¼ inch, with at least #7 monofilament webbing, beginning with the 1990-91 season.”

Two options were provided to the Commission to address the issue of the decrease in average size and quality of fish landed in the herring fishery (“apparently due to the increased

use of smaller-mesh nets"). Option One: An increase in the gill net minimum mesh and twine size to 2 ¼ inch, using No. 7 monofilament for San Francisco Bay and 2 1/8, using No. 7 monofilament for Tomales-Bodega Bay, beginning with the 1990-91 season. Also, a gill net closure in south San Francisco Bay (i.e. "BANZAI") beginning with the 1989-90 season. Option Two: Individual gill net quota of 17 tons per permittee in San Francisco Bay. This option also would include provisions to restrict the number of herring buying locations to four areas (Sausalito, Oakland, Pier 33, and Pier 45 – San Francisco), prohibit the unloading of fish between 10 p.m. and 6 a.m., and shortening the overall fishing season by two weeks. It appears that neither of these options was chosen, and there is no justification reflected in the notes.

- 1989-90 Season. No changes to mesh size or mesh measurement methods in regulation. Apparently a new method of measuring mesh size was implemented, but is not reflected in the regulations or in the DHAC meeting minutes (Pre-Adoption Notice dated July 11, 1990).

Notes from the March 14, 1990 DHAC meeting minutes:

(Net measurement and mesh size) The Department attributed an increase in roe count in the XH fishery to better compliance with the 2 1/8 inch mesh. A DHAC member noted that although the average roe counts were up during the past season, he attributed it to an influx of larger fish, rather than better enforcement of the minimum mesh size. He (DHAC member) believed that there was continue use of 2 inch mesh; Department enforcement personnel stated that many nets had been checked but there were no violations for undersize mesh. Apparently 2 1/16 inch multi-strand mesh would pass the measuring test. There was some discussion and some disagreement among industry members in attendance at the meeting as to whether the measuring technique was accurate and/or effective at eliminating the use of 2 inch mesh. There was no resolution on the matter reflected in the notes.

(Recommendations for 1990-91) Industry proposal to reduce all quotas by 30% and increase the minimum mesh size to 2 3/16 inches.

- 1990-91 Season. No changes to mesh size or mesh measurement methods in regulation. A letter dated October 24, 1990 states that "at the October 5, 1990 Fish and Game Commission meeting the Commission chose not to take any action on the proposed herring regulations for the 1990-91 season. Therefore, the existing herring regulations that were in effect for the 1989-90 fishing season shall remain in effect and shall govern the fishery during the 1990-91 season. The Commission chose this course of action because of threatened legal action based on a perceived failure to comply with California Environmental Quality Act (CEQA) requirements as regards the herring fishery."

Notes from the March 21, 1991 DHAC meeting minutes:

(Net measurement and mesh size) "Department enforcement personnel stated that enforcement had difficulty prosecuting cases involving the measuring of gill net mesh using the plastic "credit card" given to permittees. A Department enforcement officer demonstrated a measuring device that he felt would withstand a court challenge because it follows guidelines set forth by the Pennisi decision. He stated that near the end of the season, every net he measured (22) using this device was illegal. He also recommended restricting net to #7 twine and prohibiting the use of multi-strand nets. A Department biologist stated that the method of measuring mesh evolved from the trawl fishery, with four meshes stacked together. He added that the plastic card should work. An industry member reiterated the Department biologist's statement regarding the measuring of four meshes and wondered why the size of mesh was restricted for gill nets and not for round haul nets. Department enforcement personnel noted that the Alameda courts threw out cases involving illegal small mesh measured using the plastic cards. The criteria, bending of the card, were considered subjective." A discussion of multi-strand and single-strand gill nets followed with no resolution to the issue.

(Recommendations for 1991-92) In the July 11, 1990 Pre-Adoption statement, in response to an industry proposal for an increase in the minimum mesh size for gill nets from 2 1/8 inch to 2 3/16 inch, the Department responded that due to a new technique for measuring mesh, instituted prior to the 1989-90 season, which accounted for the elasticity of the net material, and an increase in the average size of the fish landed during the past season, there did not appear to be significant justification or support to increase the minimum mesh size at the present time.

A DHAC member proposed a two-week later opening date, bag limits, and that drift nets be allowed in Humboldt Bay and Crescent City.

- 1991-92 Season. No changes to mesh size or mesh measurement methods in regulation. The closure of the 'Banzai' area to gill nets from November 28 through February 14 is included in the regulations.

Notes from the March 17, 1992 DHAC meeting minutes:

(Net measurement and mesh size) "Department enforcement personnel stated that enforcement intended to look into a different net measuring procedure for next season in order to reduce the use of undersized mesh. The procedure that we are looking at involves the use of a weight and would be similar to the method employed in the State of Alaska." There was a short discussion of this method and the fact that enforcement was unable to make any cases involving mesh size with the current method. Following another lengthy discussion an industry member volunteered to work with enforcement and attempt to find a solution to the problem.

(Recommendations for 1992-93) "Enforcement to investigate potential alternative net measuring procedures."

"Increase the minimum mesh size for gill nets used in the Tomales Bay fishery from 2 inches to 2 1/8 inches." This proposal, along with a reduction in the amount of fishing gear allowed, "will reduce the potential take of younger, smaller fish, while a reduction in the amount of fishing gear will minimize potential disruption of herring schools and spawning activities." The Department and the herring industry agreed on this proposal. (June 4, 1992 Statement of Purpose for Regulatory Action)

- 1992-93 Season. Mesh size regulations: The minimum mesh size in Tomales and Bodega Bays was changed to 2 1/8 inches. No other changes to mesh size or mesh measurement methods in regulation in any other bays.

Notes from the March 16, 1993 DHAC meeting minutes:

(Net measurement and mesh size) Enforcement reviewed the problems associated with the measuring of small mesh gill nets. There was discussion that the courts had indicated that specific standards such as twine size needed to be established. Several industry members noted that it would take at least one year's notice for the manufacturers to supply new nets. The Department Deputy Chief stated that if the minimum mesh size was increased to 2 1/4 then those fishermen using the smallest nets would have to increase the minimum mesh that they used (in order to comply), and although it would resolve the problem it would improve the situation until such time that industry standards could be established and implemented. There was no resolution on this matter reflected in the notes.

(Recommendations for 1993-94) The Department recommended a 26,000 ton baseline spawn escapement as a threshold by which to open and close the fishery, which is equal to 50% of the average escapement value estimated over the 12 year period from the 1980-81 season through the 1991-92 season.

The allowance of beach seine gear in Tomales and Bodega Bays was removed because it was no longer necessary (no more beach seine permittees). (May 28, 1993 Statement of Purpose for Regulatory Action)

⇒ Note: Department staff introduced the proposal to encourage the transfer of round haul permits to the gill net fishery.

- 1993-94 Season. No changes to mesh size or mesh measurement methods in regulation. Notes from the DHAC Meeting minutes:

There were no comments specific to problems with mesh size or measurement. There was a comment from industry that although the Commission had requested the conversion to an all gill net fishery in 1979, the Commission now consisted of entirely different members and they may not want the conversion. It was reiterated that the Commission had reaffirmed its position in August, 1993 when it directed the Department Deputy Chief, representing the Department, to submit a conversion proposal for consideration in 1994.

A proposal to amend Subsection 163 (b)(2) to provide for the voluntary conversion from round haul gear to gill net gear, followed by a mandatory conversion after October 2, 1998 for all remaining round haul permits was included in the Statement of Purpose for Regulatory Action.

- 1994-95 Season. No changes to mesh size or mesh measurement methods in regulation. There were no comments specific to problems with mesh size or measurement, and there were no proposed changes to regulations specific to mesh size or measurement.

- 1995-96 Season. No changes to mesh size or mesh measurement methods in regulation.

Notes from the March 14, 1996 DHAC meeting minutes:

(Net measurement and mesh size) "Advisors were informed that the Department will vigorously enforce mesh size regulations, as a result of widespread use of undersized mesh and better net measuring procedures. Department staff spoke of salvaging a herring net, obviously in recent use, from a dumpster outside a herring buying stations. This problem is not one of a very minor decrease under the 2 1/8 minimum side, but of substantially smaller mesh. Advisors asked that the Department settle on a new measuring procedure as soon as possible and the measuring tools be easily obtained by the industry to ensure that they are ordering legal gear."

(Recommendations for 1996-97) Specify the method for measuring mesh size of herring gill nets. Following the receipt of public testimony and discussion of the regulations, the Commission modified subsection 163 (f)(2)(B) to include provisions that nets be measured "when wet after use," and that a three percent tolerance mesh measurement be allowed for the 1996-97 season only in Tomales and San Francisco bays. Language was also added to provide for research on mesh size.

The section language reads: "Length of the mesh shall be the average length of any series of 10 consecutive meshes measured from the inside of the first knot and including the last knot when wet after use; the 10 meshes, when being measured, shall be an integral part of the net as hung and measured perpendicular to the selvages; measurements shall be made by means of a metal tape measure while 10 meshes are suspended vertically from a single peg or nail, under one-pound weight. In Humboldt Bay and Crescent City Harbor, the length of any series of 10 consecutive meshes as determined by the above specifications shall not be less than 22 1/2 inches or greater than 25 inches. In Tomales and San Francisco bays, the length of any series of 10 consecutive meshes as determined by the above specifications shall not be less than 21 1/4 inches or greater than 25 inches. For the 1996-97 season only, in Tomales and San Francisco bays, a 3 percent tolerance will be allowed in the mesh measurement; thus, the

length of any series of 10 consecutive meshes as determined by the above specifications shall not be less than 20 5/8 inches or greater than 25 3/4 inches.”

There was considerable public comment during the regulatory process regarding the round-haul conversion. The following are some excerpts from the September 13, 1996 Final Statement of Reasons as to the biological benefits of the conversion.

“Two benefits are derived by reducing the catch of two and three-year-old herring: the reproductive potential of the population is increased, and management is improved because year-class strength (i.e., the size of an age group) can be assessed before that year class enters the fishery. The reproductive potential of the population is increased when young fish have the opportunity to spawn. Egg production-per-recruit analysis indicates a substantial increase in population egg production as a result of a shift in recruitment to the fishery (i.e., the age or size at which fish are first catchable by the fishing gear) from age two (age of recruitment to the round haul fishery) to four (age of recruitment to the gill net fishery).

The second improvement that results from reducing the take of two and three-year-old herring is that it allows managers to better assess the size of an incoming year class before it is fished. We don't know the size of a year class until the fish are three years old, because not all two year olds spawn. Round haul gear fishes on each year class for two seasons before the year-class strength is known. Conversion to a gill net only fishery will give managers a one year planning horizon to adjust harvest levels to protect weak year classes.”

- 1996-97 Season. Mesh size and measurement regulations: Mesh measurement method implemented with 3 percent tolerance for one year only. Language was added to provide for three permittees to participate in a Department sponsored mesh size study in San Francisco Bay.

Notes from the March 21, 1997 DHAC meeting minutes:

(Net measurement and mesh size) Many members of the DHAC expressed the desire to have the 3 percent tolerance in measurements continue. One of the concerns expressed was that a net's mesh size varied considerably depending on whether it had been soaked recently or pulled hard. Opinion on net mesh size varied considerably; some spoke of the advantages of taking larger fish while others expressed concern over reduced catch rates. Concern was also expressed over the amount of herring roe that occurred on nets and the influence of mesh size on the rate of occurrence.

The Department was asked if this was still a resource question given current enforcement efforts directed toward detecting small mesh nets. In response, Department staff indicated that the goal was still to reduce the take of 2 and 3 year-old fish. Mesh size below that allowed by regulation does negatively affect the age structure of the catch. The discussion ended with general support for keeping the 3 percent tolerance and no resolution on changes to mesh size regulations.

(Recommendations for 1997-98) It was proposed to clarify that when measuring mesh size, the 10 meshes will not include “guard mesh”.

- 1997-98 Season. Mesh size and measurement regulations: End of tolerance in mesh measurement; the length of any series of 10 consecutive meshes shall not be less than 21 1/4 meshes or greater than 25 inches. No other changes to mesh size or to mesh measurement methods in regulation.

Notes from the March 23, 1998 DHAC meeting notes, not minutes:

(Net measurement and mesh size) Concern over the lack of tolerance in mesh measurement was expressed by several DHAC members. Some members wanted the three percent tolerance in mesh measurement, some didn't, some members wanted 2 1/8 inch mesh, some didn't; in the end the discussion turned to proposing a mesh size study.

(Recommendations for 1998-99) There were no proposed changes to mesh size or mesh measurement method.

- 1998-99 Season. The round haul conversion was completed. No other changes to mesh size or mesh measurement in regulation.

Notes from the March 23, 1999 DHAC meeting minutes:

(Net measurement and mesh size) There was much discussion around the method of mesh measurement, and in summary, several industry members were felt that the problem in San Francisco Bay was not necessarily with the mesh size, but with the measurement method. Enforcement noted that although 200-250 nets were measured, only four nets were considered to be sufficiently undersized to warrant a citation and net seizure. In Tomales Bay, it was felt that the mesh size was too large. It was requested by that a mesh study be conducted as soon as possible, and it was agreed that fishermen would be included in a study design.

(Recommendations for 1999-2000) Language was proposed to allow four permittees to participate in a Department sponsored mesh size study in Tomales Bay.

- 1999-2000 Season. Mesh size regulations: Four permittees (designated by the department in writing) participating in department-sponsored research on mesh size in Tomales Bay may use gill nets approved by the department with mesh less than 2 1/8 inches.

⇒ Mesh study conducted in San Francisco Bay using 2 1/16 and 2 1/8 inch mesh. Four permittees (three odd, one special ed.) participated in the study using two-paneled nets, half 2 1/16 inch and half 2 1/8 inch mesh. The total catch for the study was 22 tons. The roe percentage was 13 and 14 percent for 2 1/16 and 1 1/8 inch mesh, respectively. A fish count of 91 and 85 per 10 kg sample of 2 1/16 and 2 1/8 inch mesh, respectively, was also recorded. These data, in general, indicate that smaller mesh catch smaller fish and larger mesh catch larger fish. The data collected represented a relatively small time period (six sampling days during a two week period), and a longer term, i.e. subsequent seasons, would be preferable.

Notes from the March 23, 2000 DHAC meeting minutes:

(Net measurement and mesh size) A Tomales Bay DHAC member expressed concern that they were using the wrong mesh size, and that since the increase in mesh size to 2 1/8 inches they have been unable to catch fish. Department staff explained that Department data indicated that Tomales Bay catch consisted of age four and older fish and that this is the management goal of the Department. The Tomales Bay DHAC member felt that 2 inch mesh would be more appropriate. A San Francisco Bay DHAC member expressed concern over the quantity of spawn seen on the gill nets, belly-caught fish and the length of time it now took to catch the quota. He felt that a mesh size reduction to 2 1/8 inches would address these concerns.

(Recommendations for 2000-01) The length of meshes of any gill net used or possessed in the roe fishery in Tomales Bay for the 2000-01 season only shall be no less than 2 inches or greater than 2 1/2 inches. The proposed one-year amendment will allow the Department to evaluate the effect of reduced mesh length on the size and age composition of herring caught in 2 inch mesh gill nets. Preliminary aging of Tomales Bay herring suggested that reduced growth of herring in offshore waters and loss of older fish from the spawning population has resulted in a mean length of herring in the commercial catch below the 5-year average. However, the 1995 and 1996 year-classes are well represented and, by number, comprised more than 50 percent of the spawning population this season.

- 2000-01 Season. Mesh size regulations: Fleet-wide mesh size study conducted in Tomales Bay using a minimum 2 inch and maximum 2 1/2 inch mesh.

Notes from the March 20, 2001 DHAC meeting minutes:

(Net measurement and mesh size) There was a brief discussion of the mesh size study in San Francisco Bay. Department staff explained that more data was needed in order to consider any further reduction in the mesh size. A DHAC member proposed contracting one of the herring boats to be used exclusively in the study, rather than having to compete with other gill-netters simultaneously, and he suggested increasing the quota for that boat to attract “high-liners”. He also suggested that the Department keep a portion of the proceeds from the sale of product from the higher quota and use it to pay for Departmental research costs. The DHAC members supported this idea and one DHAC member volunteered the use of his boat.

(Recommendations for 2001-02) Amend subsection (f)(2)(B) to specify the size of peg or nail used on certified net measuring devices.

- 2001-02 Season. Mesh size and measurement regulations: Continuation of the fleet-wide mesh size study in Tomales Bay. Clarification of the size of peg and weight used in the measurement of mesh was added to Section 163, subsection (f)(2)(B) to read: ...while 10 meshes are suspended vertically under one-pound weight, from a stainless steel peg or nail of no more than 5/32 inch in diameter ~~under one-pound weight~~. A provision was also added to subsection (g)(4)(B) to allow ten tons of the fresh fish quota to be transferred to gill net permittees participating in Department sponsored research.

Notes from the March 27, 2002 DHAC meeting minutes:

(Net measurement and mesh size) There was a discussion of re-initiating the mesh size study in San Francisco Bay for the 2002-03 season. A Department biologist stated that no funding was available for the Department to conduct the study and suggested that the industry form a subcommittee to discuss and form a proposal for a collaborative study with the Department. A DHAC member voiced concern that the mesh size being used could be harming the resource by not catching fish efficiently, i.e. causing latent mortality of the squeezed fish through the net and also increasing the fleet’s fishing effort and subsequent disturbance of schools. He also questioned the biological rationale for enforcing the 2 1/8 inch mesh size. Department staff explained that the reason for the 2 1/8 inch mesh is to concentrate the fishing effort on herring in the 4-year and older age classes, and reducing the mesh size could increase the number of two and three year old herring in the commercial catches. Another DHAC member questioned why the data from the mesh size study in Tomales Bay could not be extrapolated for San Francisco Bay and Department staff explained that the Tomales Bay fishery was managed separately from the San Francisco Bay and has always had different environmental conditions and concerns. He detailed these differences, emphasizing the importance that the study be specific to San Francisco Bay and that any changes must be based on localized scientific data.

(Recommendations for 2002-03) Revise the individual quota provisions for permittees participating in a mesh size study in San Francisco Bay to 0.5 percent of the sac roe quota for each platoon to which a permittee is assigned, and increase the maximum number of permittees that may participate in a mesh size study in San Francisco Bay from three to six. Continue the provision to transfer ten tons of the fresh fish quota to gill net permittees participating in the Department sponsored research.

- 2002-03 Season. Mesh size regulations: Continuation of the Tomales Bay mesh size study. Subsection (g)(4)(A) was amended to read: ...Each gill net permittee (designated by the department in writing) participating in research sponsored by the department shall be assigned an individual quota equal to 0.5 percent of the season gill net quota per assigned platoon, unless provided for pursuant to subsection (g)(4)(B) of these regulations.

Notes from the March 25 and 26, 2003 DHAC meeting minutes:

(Net measurement and mesh size) The Department discussed development of a model based on historical data rather than conducting a mesh size study, as was discussed at the pre-season DHAC meeting. Several DHAC members expressed concern that the use of 2 1/8 inch mesh in San Francisco was harmful to the resource, i.e. fish were squeezing through the nets and possibly injured or killed in the process. One member suggested that a smaller mesh size will help reduce eggging on nets while allowing the fishermen to catch the population that exists. The concern of one DHAC member was that the fishery was not managed for economic viability. Several San Francisco Bay DHAC members noted that they used to use the 2 1/16 inch mesh without any problems belly-catching or scaling fish, but the change (in mesh) took place because of regulatory capabilities. Department enforcement personnel clarified that San Francisco fishermen are actually fishing with nets that are 2 3/32 inch which stretch to be 2 1/8 inch when they are wet. A discussion of the regulatory language ensued and it was agreed the two different interpretations could be drawn from the way the regulations are written, and that they should be clarified to eliminate contradiction.

A change to Title 14 was proposed on behalf of Cal Herring, a herring fishermen's association, to reduce the mesh size to 2 1/16 inch mesh measure dry. A previous Department study examining stretch length after 11-12 hours of soaking was cited as a basis for the dry measure. The stretch study found that the nets would stretch from 3/8 inch to 7/8 inch over ten mesh lengths. Later, other DHAC members expressed that a dry mesh measurement is important for the fishery management.

(Recommendations for 2003-04) Due to several concerns, expressed by the Department, regarding the status of the San Francisco Bay stock two quota options were given to the Fish and Game Commission to consider. Option one, the Department preferred option, was a fishery closure (zero quota). Some of the concerns regarding the status of the stock included a shrinking age class structure (fewer age classes represented in the population), a lack of strong recruitment to the fishery, a decline in catch per unit effort, and several years of below average biomass. The Department had been developing a stock assessment model, Coleraine, to evaluate both the status of the stock and the accuracy of the two survey methods used to estimate biomass. The model results indicated that the stock was at approximately twenty percent of its un-fished level. Given the above concerns, and the increasing divergence in both size and trend of the results from the two survey methodologies, the Department sought an independent peer review of the Coleraine model and the survey methodologies. The peer review results confirmed the Coleraine model results and enumerated several suggestions for improving the survey methodologies.

- 2003-04 Season. Continuation of the fleet-wide Tomales Bay mesh size study. No other changes to mesh size or measurement in the other bays.

Notes from the March 25 and April 30, 2004 DHAC meeting minutes:

(Net measurement and mesh size) The format of the meeting minutes changed from a summary of the meeting discussions to bulleted comments on various topics. Comments on mesh size by DHAC and industry members included the desire to decrease mesh size to take a broader cross-section of the population, that the current mesh measurement method resulted in citations, a request for the Department to sell "official" standardized measuring devices, use existing data to reduce minimum mesh size to 2 inches, appreciation for implementing and enforcing a larger mesh size, a request for a response as to why the mesh measurement method was changed when the previous method was successful, and a proposal to go to 2 1/16 inch mesh or to 20 5/8 inch over ten meshes measured dry. The Department responded to all requests of the DHAC March 25 meeting in a detailed letter dated April 23, 2004. At the April 30, 2004 DHAC meeting, DHAC representatives were told that they could submit proposals for a mesh study directly to the Commission, or to the Department, for consideration. The Department received one proposal directly from a DHAC representative, and two proposals through the Commission process. In summary, two of the proposals outlined a fleet-wide study reducing the minimum mesh size to 2 1/16 inches measured dry. The third proposal outlined

the used of a minimum mesh size of 2 inches measured wet and a change to the method of measurement (i.e. change in peg size).

(Recommendations for 2004-05) Continuation of the fleet-wide Tomales Bay mesh size study. No other changes to mesh size or measurement in the other bays.

Summary of source documents. This is a list of the documents that are available in the Belmont office for each year. A checkmark ✓ indicates that the document was used as a reference for the above information.

Season	Regulatory documents	Regulations	DHAC meeting minutes
1975-76	none on file in Belmont	draft available ✓	
1976-77	none on file in Belmont	draft available ✓	
1977-78	none on file in Belmont	draft available ✓	available
1978-79	none on file in Belmont	draft available ✓	available
1979-80	none on file in Belmont	draft available	available
1980-81	pre-pub	draft available	available ✓
1981-82	all docs ✓	draft available	available
1982-83	pre-adopt	draft available✓	available ✓
1983-84	pre-adopt	available✓	available ✓
1984-85	pre-adopt ✓	draft available ✓	available ✓
1985-86	pre-adopt	draft available ✓	available ✓
1986-87	none on file in Belmont	available	available ✓
1987-88	none on file in Belmont	draft available ✓	available ✓
1988-89	pre-pub ✓	available	available ✓
1989-90	pre-pub, pre-adopt ✓	available	available ✓
1990-91	pre-pub, pre-adopt ✓	available	available ✓
1991-92	all docs ✓	available✓	available ✓
1992-93	all docs ✓	available✓	available ✓
1993-94	all docs ✓	draft available	available
1994-95	all docs	draft available	available ✓
1995-96	all docs ✓	available	available ✓
1996-97	pre-adopt, final	available✓	available ✓
1997-98	all docs	available✓	available ✓
1998-99	all docs ✓	available	available ✓
1999-2000	ISOR, final ✓	available✓	available ✓
2000-01	ISOR, final ✓	available✓	available ✓
2001-02	all docs ✓	available✓	available ✓
2002-03	all docs ✓	available✓	available ✓
2003-04	all docs ✓	available	available ✓